

CLAIMS

What is claimed is:

1. A method for providing computer network access, comprising:
 - receiving a PPP session creation request from a client, said PPP session creation
 - 5 request including a control protocol frame encapsulated therein;
 - obtaining user domain information associated with said PPP session creation request;
 - setting up a Layer 2 tunnel according to a parameter contained in said control protocol frame;
 - 10 creating an ingress PPP object associated with an incoming PPP session, a host object associated with said client, and an egress PPP object associated with said Layer 2 tunnel;
 - creating an egress IP object based upon obtained user domain information, said egress IP object associated with IP-based forwarding;
 - 15 linking said ingress PPP object, said host object, and said egress PPP object, thereby forwarding data packets from a PPP session with said client over said Layer 2 tunnel; and
 - linking said host object and said egress IP object, thereby forwarding IP frames received from said client over a link other than said Layer 2 tunnel.
 - 20
2. The method according to claim 1, wherein said setting up includes forwarding control protocol negotiations.

3. The method according to claim 1, further including:

receiving an IP address through said Layer 2 tunnel, said IP address having been assigned to said client; and

transferring said IP address to said client.

5

4. The method according to claim 1, wherein said user domain information is obtained from said PPP session creation request.

5. The method according to claim 1, wherein said user domain information is

10 obtained using a user profile.

6. The method according to claim 1, wherein said user domain information is obtained from user identification information associated with a physical connection of said PPP session creation request.

15

7. The method according to claim 6, wherein said user domain information is obtained from a line number used by said client for transmitting said PPP session creation request.

20 8. The method according to claim 1, wherein said user domain information is obtained from user identification information associated with a physical location of said client.

9. The method according to claim 1, further comprising:

maintaining a forwarding information base for said host object, said forwarding information base containing at least one association between a network address and either said ingress PPP object or said egress PPP object.

5

10. The method according to claim 9, wherein said forwarding information base includes a default link to said egress PPP object.

11. The method according to claim 9, wherein said forwarding information base is
10 stored in the form of a hash table.

12. The method according to claim 1, wherein said creating an ingress PPP object includes creating an access PPP object associated with a PPP connection to said client via a first interface.

15

13. The method according to claim 12, wherein said creating an egress PPP object includes:

creating a first connection object containing a range of IP addresses;

creating an aggregation PPP object associated with outgoing PPP frames; and

20 creating a tunnel object associated with Layer 2 tunneling through a second interface.

14. The method according to claim 13, wherein said first connection object includes a list of network addresses.

15. The method according to claim 13, wherein said creating an egress IP object

5 includes:

creating a second connection object containing a range of IP addresses; and

creating a service object associated with IP frame forwarding through a third interface.

10 16. The method according to claim 15, wherein said second connection object includes a list of network addresses.

17. The method according to claim 15, further comprising maintaining a forwarding information base for said host object, said forwarding information base containing:

15 an association between said access PPP object and an address of said client; and a default link to said aggregation PPP object.

18. The method according to claim 17, wherein

said creating said first connection object includes adding into said forwarding

20 information base an association between said aggregation PPP object and a corresponding network address, and

said creating said second connection object includes adding into said forwarding information base an association between said service object and a corresponding network address.

- 5 19. A network device for providing computer network access, said network device comprising:

a first interface for receiving a PPP session creation request from a client, said PPP session creation request including a control protocol frame encapsulated therein;

a second interface for forwarding data packets from a PPP session over a Layer 2

10 tunnel;

a third interface for forwarding IP frames over a link other than said Layer 2 tunnel;

a memory; and

a processor coupled with said first interface, said second interface, said third

15 interfaces, and said memory, said processor including:

a domain information determiner for obtaining user domain information associated with said PPP session creation request;

an object generator for creating objects in said memory, said object generator creating an ingress PPP object associated with an incoming PPP session, a host object associated with said client, an egress PPP object associated with Layer 2 tunneling through said second interface, and an egress IP object associated with IP-based forwarding through said third

20

interface, said egress IP object being created based upon obtained user domain information;

a PPP session forwarder for setting up a Layer 2 tunnel according to a parameter contained in said control protocol frame, and for linking said ingress PPP object, said host object, and said egress PPP object, thereby forwarding data packets from a PPP session with said client over said Layer 2 tunnel; and

an IP frame forwarder for linking said host object and said egress IP object, thereby forwarding IP frames received from said client over a link other than said Layer 2 tunnel.

20. The network device according to claim 19, wherein said ingress PPP object includes an access PPP object associated with a PPP connection with said client via said first interface.

21. The network device according to claim 19, wherein said egress PPP object includes:

a PPP session connection object containing a range of IP addresses;
an aggregation PPP object associated with outgoing PPP frames; and
a tunnel object associated with Layer 2 tunneling through said second interface.

22. The apparatus according to claim 19, wherein said egress IP object includes:
an IP frame connection object containing a range of IP addresses; and

a service object associated with IP frame forwarding through said third interface.

23. The network device according to claim 19, wherein said PPP session forwarder forwards control protocol negotiations when setting up said Layer 2 tunnel.

5

24. The network device according to claim 19, wherein said PPP session forwarder includes:

an IP address forwarder for receiving an IP address through said Layer 2 tunnel, said IP address having been assigned to said client, and for transferring said IP address to said client.

10

25. The network device according to claim 19, wherein said domain information determiner obtains said user domain information from said PPP session creation request.

15

26. The network device according to claim 19, wherein said domain information determiner obtains said user domain information using a service profile.

27. The network device according to claim 19, wherein said domain information determiner obtains said user domain information from user identification information

20 associated with a physical connection of said PPP session creation request.

28. The network device according to claim 27, wherein said domain information determiner obtains said user domain information from a line number used by said client for transmitting said PPP session creation request.

29. The network device according to claim 19, wherein said domain information determiner obtains said user domain information from user identification information associated with a physical location of said client.

30. The network device according to claim 19, further comprising:

a forwarding information base provided for said host object, said forwarding information base containing at least one association between a network address and either said ingress PPP object or said egress PPP object.

31. The network device according to claim 30, wherein said forwarding information base includes a default link to said egress PPP object.

32. The network device according to claim 30, wherein said forwarding information base is stored in the form of a hash table.

33. An apparatus for providing computer network access, said apparatus comprising:
a PPP session receiving interface;
a PPP session Layer 2 tunneling interface;
an IP frame forwarding interface;

a memory, said memory containing:

an ingress PPP object associated with said PPP session receiving interface;

a host object associated with a client requesting network access;

5 an egress PPP object associated with said PPP session Layer 2 tunneling interface; and

an egress IP object associated with said IP frame forwarding interface; and

a processor coupled with said PPP session receiving interface, said PPP session

10 Layer 2 tunneling interface, said IP frame forwarding interface, and said memory, said processor including:

a user domain information determiner;

an object generator responsive to said user domain information determiner;

15 a PPP session forwarder linking through said ingress PPP object, said host object, and said egress PPP object; and

an IP frame forwarder linking through said host object and said egress IP object.

20 34. An apparatus according to claim 33, further comprising:

a forwarding information base associated with said host object, said forwarding information base containing at least one association between a network address and either said ingress PPP object or said egress PPP object.

35. The apparatus according to claim 34, wherein said forwarding information base is stored in the form of a hash table in said memory.

5 36. The apparatus according to claim 34, wherein said forwarding information base includes a default link to said egress PPP object.

37. The apparatus according to claim 36, wherein said forwarding information base further includes an association between said egress IP object and a corresponding
10 network address.

38. The apparatus according to claim 33, wherein said ingress PPP object includes an access PPP object associated with a PPP connection to said client via said PPP session receiving interface.
15

39. The apparatus according to claim 33, wherein said egress PPP object includes:
a PPP session connection object containing a range of IP addresses;
an aggregation PPP object associated with outgoing PPP frames; and
a tunnel object associated with Layer 2 tunneling through said PPP session Layer
20 2 tunneling interface.

40. The apparatus according to claim 33, wherein said egress IP object includes:
an IP frame connection object containing a second range of IP addresses; and

a service object associated with IP frame forwarding through said IP frame forwarding interface.

41. A system for providing computer network access, comprising:

5 means for receiving a PPP session creation request from a client, said PPP session creation request including a control protocol frame encapsulated therein;

means for obtaining user domain information associated with said PPP session creation request;

10 means for setting up a Layer 2 tunnel according to a parameter contained in said control protocol frame;

means for creating an ingress PPP object associated with an incoming PPP session, a host object associated with said client, an egress PPP object associated with said Layer 2 tunnel;

15 means for creating an egress IP object based upon obtained user domain information, said egress IP object associated with IP-based forwarding;

means for linking said ingress PPP object, said host object, and said egress PPP object, thereby forwarding data packets from a PPP session with said client over said Layer 2 tunnel; and

20 means for linking said host object and said egress IP object, thereby forwarding IP frames received from said client over a link other than said Layer 2 tunnel.

42. The system according to claim 41, wherein said means for setting up includes means for forwarding control protocol negotiations.

43. The system according to claim 41, further including:

means for receiving an IP address through said Layer 2 tunnel, said IP address having been assigned to said client; and

5 means for transferring said IP address to said client.

44. The system according to claim 41, wherein said user domain information is obtained from said PPP session creation request.

10 45. The system according to claim 41, wherein said user domain information is obtained using a user profile.

46. The system according to claim 41, wherein said user domain information is obtained from user identification information associated with a physical connection of
15 said PPP session creation request.

47. The system according to claim 46, wherein said user domain information is obtained from a line number used by said client for transmitting said PPP session creation request.

20

48. The system according to claim 41, wherein said user domain information is obtained from user identification information associated with a physical location of said client.

49. The system according to claim 41, further comprising:

means for maintaining a forwarding information base for said host object, said forwarding information base containing at least one association between a network address and either said ingress PPP object or said egress PPP object.

50. The system according to claim 49, wherein said forwarding information base includes a default link to said egress PPP object.

51. The system according to claim 49, wherein said forwarding information base is stored in the form of a hash table.

52. The system according to claim 41, wherein said ingress PPP object includes an access PPP object associated with a PPP connection to said client via a first interface.

53. The system according to claim 52, wherein said egress PPP object includes:
a first connection object containing a range of IP addresses;
an aggregation PPP object associated with outgoing PPP frames; and
a tunnel object associated with Layer 2 tunneling through a second interface.

54. The system according to claim 53, wherein said first connection object includes a list of network addresses.

55. The system according to claim 53, wherein said egress IP object includes:
a second connection object containing a range of IP addresses; and
a service object associated with IP frame forwarding through a third interface.

5 56. The system according to claim 55, wherein said second connection object
includes a list of network addresses.

57. The system according to claim 55, further comprising means for maintaining a
forwarding information base for said host object, said forwarding information base
10 containing:

an association between said access PPP object and an address of said client; and
a default link to said aggregation PPP object.

58. The system according to claim 57, wherein

15 said means for creating said first connection object includes means for adding into
said forwarding information base an association between said aggregation PPP object and
a corresponding network address, and

said means for creating said second connection object includes means for adding
into said forwarding information base an association between said service object and a
20 corresponding network address.

59. A program storage device readable by a machine, tangibly embodying a program of instructions executable by the machine to perform a system for providing computer network access, the system including:

receiving a PPP session creation request from a client, said PPP session creation

5 request including a control protocol frame encapsulated therein;

obtaining user domain information associated with said PPP session creation request;

setting up a Layer 2 tunnel according to a parameter contained in said control protocol frame;

10 creating an ingress PPP object associated with an incoming PPP session, a host object associated with said client, and an egress PPP object associated with said Layer 2 tunnel;

creating an egress IP object based upon obtained user domain information, said egress IP object associated with IP-based forwarding;

15 linking said ingress PPP object, said host object, and said egress PPP object, thereby forwarding data packets from a PPP session with said client over said Layer 2 tunnel; and

linking said host object and said egress IP object, thereby forwarding IP frames received from said client over a link other than said Layer 2 tunnel.

20